

## ARCOSKOP

**SP**

### Maintenance Instructions

System

ARCOSKOP

The protocol SPR2-250.832.01.03.02 is required for these instructions

© Siemens AG 1999

The reproduction, transmission or use of this document or its contents is not permitted without express written authority. Offenders will be liable for damages. All rights, including rights created by patent grant or registration of a utility model or design, are reserved.

**Document revision level**

The document corresponds to the version/revision level effective at the time of system delivery. Revisions to hardcopy documentation are not automatically distributed.

Please contact your local Siemens office to order current revision levels.

**Disclaimer**

The installation and service of equipment described herein is to be performed by qualified personnel who are employed by Siemens or one of its affiliates or who are otherwise authorized by Siemens or one of its affiliates to provide such services.

Assemblers and other persons who are not employed by or otherwise directly affiliated with or authorized by Siemens or one of its affiliates are directed to contact one of the local offices of Siemens or one of its affiliates before attempting installation or service procedures.

## Table of Contents

<b>1</b>	<b>General information</b>	<b>4</b>
	Requirements	4
	Required documents	5
	Systems equipped with SIMOMED N X 2080 monitor	5
	Systems equipped with standard 100/120 Hz monitor, part no.: 30 64 581 B5310	5
	Systems equipped with an I.I. laser light localizer	5
	For compressor, USA only	5
	Required tools, measurement and auxiliary devices	6
	Spare parts which may be needed	7
	Emphasized text	8
	Safety information and protective measures	9
	Description of abbreviations	10
	Maintenance interval	11
	For compressor, USA only	12
<b>2</b>	<b>Inspection of exterior and surroundings</b>	<b>13</b>
	Inspection of exterior	13
	Inspection of surroundings	14
	Power outlets	14
<b>3</b>	<b>Safety inspection</b>	<b>15</b>
	Mechanical safety	15
	Electrical safety	17
<b>4</b>	<b>Maintenance, operating value/functional inspection</b>	<b>20</b>
	Maintenance	20
	Operating value inspection	21
	Functional inspection	22
<b>5</b>	<b>Final result/quality inspection and maintenance</b>	<b>24</b>
<b>6</b>	<b>Final Work Steps</b>	<b>25</b>
<b>7</b>	<b>Changes to Previous Version</b>	<b>26</b>

## 1 General information

### 1.1 Requirements

The requirements described in chapter 1 of the service instructions also apply to the maintenance described in this document.

## 1.2 Required documents

• Safety information according to ARTD, part 2	
• Maintenance protocol	SPR2-250.832.01...
• Service instructions	SPR2-250.898.01...
• Spare parts list	
• Image quality quick test	SPR2-250.820.01...

### 1.2.1 Systems equipped with SIMOMED N X 2080 monitor

• Maintenance check list	Z35
• Adjustment instructions	RX52-060.061.02..

### 1.2.2 Systems equipped with standard 100/120 Hz monitor, part no.: 30 64 581 B5310

• Maintenance instructions	SPR2-230.101.01...
• Maintenance protocol	SPR2-230.105.01...

### 1.2.3 Systems equipped with an I.I. laser light localizer

• Installation and setting instructions	RXR2-120.033.03
---	-----------------

### 1.2.4 For compressor, USA only

• Maintenance instructions	6190800-V2-1000.02.00
• Maintenance instructions	Series MDK 6 - MDK 15

## 1.3 Required tools, measurement and auxiliary devices

**NOTE**

The indicated items are listed in the STC (Service Tools Catalog) unless otherwise stated (the STC is a component of the Spare Parts Catalog) with the exception of items marked with "\*\*\*".

Tool	For example	Material no.:
• Standard tool kit*		
• Set of Allen keys*		
• Spring balance rated for up to 200 N		44 15 113 RH090
• Equivalent leakage current tester	Bender safety tester	97 06 979 Y0526 or 51 38 727 RE999
• Protective conductor meter		44 15 899 RV090
• DVM Fluke 8060A		97 02 101 Y4290
• Dose meter	PTW-Nomex PTW-Diados	97 08 637 Y0388 97 17 612 Y0388
• Dynamic test kit		37 90 156 X1963
• Precision X-ray filter		99 00 598 XE999
• Set of resolution tests		28 71 820 RE999
• Set of radiation filters		97 98 596 G5321
• Set of radiation filters		81 60 145 RE999
• Centering cross (only with Diamentor)		96 60 051 RE999
• Luminance meter (Mavo monitor)		97 02 432 Y0526
• Service PC acc. to ARTD		
• Cable for connecting service PC to host		99 00 440 RE999
• Service software		
• Sealing compound		34 43 009
• Internal line impedance meter		84 28 104 Y4337
• Special oil (Optimol Optipit)		55 07 525
• Special oil (Slic Pac PTFE)		55 07 517
• Torque wrench		34 30 063 or 34 24 553

## 1.4 Spare parts which may be needed

• Conductive rubber on the monitor trolley	
• Touch-up paint	34 44 403
• Spray paint	84 27 734 RH999

## 1.5 Emphasized text




 <b>DANGER</b>	<b>DANGER</b> indicates when there is an immediate danger that l e a d s to death or serious physical injury.
 <b>WARNING</b>	<b>WARNING</b> indicates a risk of danger that m a y l e a d to death or serious physical injury.
 <b>CAUTION</b>	<b>CAUTION</b> used with the safety alert symbol indicates a risk of danger that leads to slight or moderate physical injury and/ or damage to property.
<b>NOTICE</b>	<b>NOTICE</b> used without the safety alert symbol indicates a risk of danger that if disregarded leads or may lead to a potential situation which may result in an undesirable result or state other than death, physical injury or property damage.

Fig. 1: Safety Notes



## 1.6 Safety information and protective measures

**NOTE**

- When performing service work and tests adhere to:
  - The product-specific safety instructions in the documentation,
  - Safety information TD00-000.860.01...,
  - The general safety information contained in the ARTD part 2.
- Disconnect the power plug when performing service on the AR-COSKOP.
- Ensure compliance with general safety requirements when working with the system under power.
- Observe ESD regulations!
- Switch off the system prior to replacing modules or PC boards.
- After completing all service work and reattaching the covers, perform the protective conductor test according to ARTD-002.731.17.
- The protective conductor resistance must not exceed 0.2 ohms.
  - When performing service work on the power-on module, (replacing the power-on module or replacing the power cable), the equivalent leakage current must be measured and recorded.
- Checks and settings that need to be performed with the radiation switched on are identified by the radiation warning symbol.  
While performing adjustments labeled in this manner, radiation protective clothing must be worn.

**NOTICE**

This product contains two class 2 lasers .  
(USA: class 2 laser).

Observe the safety instructions in ARTS-002.002.731.03.

- ⇒ When working with the laser light localizer, do not look directly into the laser beam.

**NOTE**

The eye is not in immediate danger.

However, it is important not to look directly into the beam.

## 1.7 Description of abbreviations

Abbrev.	Description
SI	Safety Inspection
SIE	Electrical Safety
SIM	Mechanical Safety
PM	Preventive Maintenance
PMP	Periodic Preventive Maintenance
PMA	Preventive Maintenance Adjustments
PMF	Preventive Maintenance, Operating Value Check, Function Check
Q	System Quality, Image Quality
QIQ	Image Quality
QSQ	System Quality
SW	Software Maintenance

The steps identified by these abbreviations are part of the maintenance protocol and should be checked off upon completion.

**NOTE**

**The sequence for complete maintenance and inspection is described on the following pages.**

**Each work step must be performed on an annual basis, if not otherwise specified.**

## 1.8 Maintenance interval

12 months

## 1.9 For compressor, USA only

- Maintenance should be completed according to manufacturer documentation.
- The documents are located in the system folder under "maintenance".
  - Operating instructions Jun-Air compressor 6190800-V2-1000.02.00.
  - Technical documents for end-position dryer MDK 6-MDK 15.

## 2 Inspection of exterior and surroundings

### 2.1 Inspection of exterior

#### **PMP Damage**

Inspect the entire system for damage, such as damage to the housing or paint.

**2.2 Inspection of surroundings****2.2.1 Power outlets****SIE Damage****SIE Line voltage****SIE Internal line impedance**

- Inspect the power outlets used for system operation for damage.
- Measure the line voltage and compare it to the line voltage label on the monitor trolley.
- Measure the internal line impedance.

## 3 Safety inspection

### 3.1 Mechanical safety

#### **SIM Covers**

- Inspect the covers of the ARCOSKOP and the monitor trolley/MSS (monitor support system) for mechanical damage and effective fastening.

#### **SIM Cable deflectors**

- Inspect the cable deflectors on the monitor trolley and replace them if necessary.

#### **SIM I.I. laser light localizer mechanism**

- Inspect the I.I. laser light localizer for mechanical damage.
- Mount the I.I. laser light localizer on the I.I. and ensure proper locking and seating. Pay special attention to the tension band and its closure.

#### **SIM I.I. laser light localizer function**

- Perform maintenance on the I.I. laser light localizer according to Installation and Setting Instructions RXR2-120.033.03...

#### **SIM Laser light localizer mechanism**

- Inspect the I.I. attachment of the laser light localizer for mechanical damage.
- Install the I.I. attachment of the laser light localizer on the I.I. and ensure proper locking and seating.
- Check the I.I. ring for damage.

#### **SIM Brakes**

- Check the gastro foot switch and brake function.
- Use the spring balance to check the braking forces for the orbital movement, angulation movement, and rotary joints.

#### **SIM C-arm**

- Perform all C-arm movements, checking for slackness of the bearings and bearing noises.
- Orbital movement: When the orbital brake is released, the C-arm may independently move a maximum of 5°. Check the servo assistance of the orbital movement for proper operation. Check whether the orbital movement is running smoothly.

#### **SIM Stand**

- Check the corrugated hoses on the ARCOSKOP stand for damage.
- Check the stand joint covers, closing caps of the stand members, and the covers of the ceiling installation for proper fastening.

#### **SIM Remote control panel**

- Check the corrugated hose for mechanical damage.
- Ensure proper functioning of the locking screw for the remote control panel.
- Check the remote control panel for mechanical damage.

#### **SIM E-box**

- Open the e-box (electronics box) slowly and check the operation of the pneumatic springs.
- Ensure proper functioning of the built-in fan in the e-box and, if necessary, clean the ventilation slots. Lock the lid of the e-box after completing these work steps.

#### **SIM Lifting column**

##### **NOTE**

**There may not be any additional weight on the C-arm, e.g. lead aprons or other cover panels, when performing these tests and settings.**

- Electrically move the lifting column over its entire lift range.
  - Listen for noises and check for play in the bearings.
  - The lifting column movement must switch off automatically when the end positions are reached.
- Check the C-arm safety distance from the floor of at least 5 cm.

#### **SIM Emergency stop button**

- Press the emergency stop button.
- When the buttons for raising or lowering the column are pressed, the lifting column may not move.
- Release the orbital brake. The LED in the button lights up.
- The servo assistance of the orbital movement must not function. The C-Arm may move in the orbital direction only when increased force is exerted.
- Release the emergency stop button.
- The servo assistance of the orbital movement is active again. The C-arm may move again in the orbital direction when minimal force is exerted.
- The lifting column can be moved again.
- Reactivate the orbital brake.

#### **SIM Monitors**

- Inspect the housing for mechanical damage.
- Ensure that the monitors are securely attached to the monitor trolley.
- If further associated monitors are installed on wall brackets or a monitor support system, also test these as described above.

#### **SIM Warning labels**

- Ensure that all required warning labels are attached and in good condition.
  - Replace any labels that are difficult to read.
- Ensure that all required ID labels are attached and in good condition.
  - Replace any labels that are difficult to read.

Position of the labels: See ARCOSKOP operating instructions.



## 3.2 Electrical safety

### SIE Cables and plugs

- Check visible system cables and plugs for damage.

### SIE Voltage discharge rubber

- Check the conductive rubber on the ARCOSKOP monitor trolley for damage or contamination, replace if necessary.

### SIE Checking the POWERPHOS inverter cables

- Remove the POWERPHOS cover.
- Tighten the contact screws X7 and X9 with a torque of 4.8 Nm.
- Refit the cover and seal it with sealing compound.

#### NOTE

Before fitting the cover hood, it is expedient to check the operation of the fan.

([Maintenance / p. 20](#)), PMP POWERPHOS fan.

- Reattach the cover hood.

### SIE Fluoroscopy timer

- Inspection: See "Compulsory radiation switch off" section.

### SIE Audible warning signal

- Inspection: See "Compulsory radiation switch off" section.

### SIE Radiation indicators

- Inspection: See "Compulsory radiation switch off" section.

### SIE Radiation release switch

- Inspection: See "Compulsory radiation switch off" section.

### SIE Compulsory radiation switch off



- Test the functioning of the audible warning signal and compulsory radiation switch off (if required) according to the country-specific regulations. Perform the following checks:
- Switch on fluoroscopy for one minute. Use a wrist watch to check the fluoroscopy timer for correct operation.
- All radiation indicators on the control console of the ARCOSKOP and on the monitor trolley/MSS (monitor support system) must light up during radiation.
- Ensure proper functioning of the radiation release switches (hand and foot switches).
- Check the radiation release switches for damage.
- Check the cables of the hand and foot switches for mechanical damage.
- Check the cables of the hand and foot switches for cable breakage or short-circuit by moving them.

**NOTE**

The acoustic warning signal must sound every 4, 5, or 9.5 minutes of the fluoroscopic time depending on the system programming.

It sounds again every 5 or 10 minutes. It is turned off by pressing the -0- button once.

Pressing this button again resets the fluoroscopic timer to "0".

Depending on the country-specific programming, either the required radiation shut off does not occur or it occurs every 5 or 10 minutes and then every 5 or 10 minutes after that.

**SIE Iris collimator**

- Check the iris collimator and correct it, if necessary.
  - Select I.I. full format.
  - Open the iris collimator completely.
  - Activate fluoroscopy briefly.
  - The collimator blades must be clearly visible at the edges of the image.
  - Select the zoom format.
  - Activate fluoroscopy briefly.
  - The collimator blades must be clearly visible at the edges of the image.

**SIE Dose rate**

- Check the dose rate. Refer to the ARCOSKOP service instructions.

**SIE Area-dose product measuring device**

- Check the area dose product measuring device (DIAMENTOR).  
Refer to the ARCOSKOP service instructions.

**SIE Image quality of the monitor(s)**

- Check the luminance and the ambient light sensor.  
Refer to the maintenance instructions of the monitor.

**SIE ARCOSKOP image quality**

- Perform the ARCOSKOP image quality quick test.

**NOTE**

Image quality is checked during the safety inspection but can also be performed at the end of maintenance.

See [\(Final result/quality inspection and maintenance / p. 24\)](#).

**SIE Monitors**

- Check the monitors according to the maintenance instructions.
- The checks/tests already performed (checking damage to the housing, luminance check, ambient light sensor check and the IQ quick test) do not have to be repeated a second time.

**SIE Laser light localizer**

- Test the automatic switch-off of the laser light localizer after 5 minutes.
- Turn the image intensifier attachment to check that the lines of the crosshairs agree vertically and horizontally with the laser light cross.

## **SIE Protective conductor test**

- Perform the protective conductor test according to ARTD-002.731.17.... The protective conductor resistance must not exceed 0.2 ohms.

### **NOTE**

**The protective conductor test is part of the safety inspection. However, it cannot be performed until all maintenance work has been completed.**

See [\(Final Work Steps / p. 25\)](#).

## **SIE Equivalent leakage current**

- Measure and record the equivalent leakage current and compare it to the value measured during the initial start-up.
- The measured value must not exceed the initially measured value by more than 50%. In addition, the limit of 2 mA must not be exceeded.

### **NOTE**

**The instructions according to ARTD-002.731.17 are to be adhered to outside the scope of validity of DIN VDE 0751.**

### **NOTE**

**The equivalent leakage current test is part of the safety inspection but can only be performed when the system is closed.**

See [\(Final Work Steps / p. 25\)](#).

### 4 Maintenance, operating value/functional inspection

#### 4.1 Maintenance

**PMP Cleaning the system**

- Clean the entire system:
  - Visible cables
  - Exterior surfaces
  - Contact surfaces of wheels
  - Interior space

**PMP System ventilation**

- Clean the ventilation slots on the monitor trolley and the e-box (electronics box).

**PMP POWERPHOS fan**

- Remove the cover over the POWERPHOS.
- Test the visible fan for proper operation.
- Test the fan installed in the C-arm for proper operation. For this purpose, mechanically block the visible fan briefly. The fan installed in the C-arm must run audibly.

**PMP Memoskop ventilation**

- Clean the ventilation slots on the MEMOSKOP Fast.
- Ensure that the fan is functioning properly.

## 4.2 Operating value inspection

### PMF Error memory

- Read out and evaluate the error memory.

### 4.3 Functional inspection

#### PMF Video printer option

- Check the cables, plugs, and functioning of the video printer.
- Check the remote release keys of the ARCOSKOP.

#### PMF Video recorder option

- Check the cables, plugs, and functioning of the video recorder.
- Check the remote release (REC pause start/REC pause stop).

#### PMF Laser camera connection option

- Check the cables and plugs of the laser camera connection.
- The video socket installed in the monitor trolley must not have a ground/protective conductor connection. The shield of the video cable to the laser camera must not have any contact with the protective conductor of the ARCOSKOP monitor trolley. For the measurement briefly disconnect the connected video cable and the remote release cable.
- Perform the measurement using an ohmmeter.
- The floating contacts of the remote release socket must not have a ground/protective conductor connection.
- The shield of the remote release cable to the laser camera must not have any contact with the protective conductor of the ARCOSKOP monitor trolley. For the measurement briefly disconnect the connected video cable and the remote release cable. Perform the measurement using an ohmmeter.

#### PMF Operating functions

- Check all system operating functions. The previously performed operating steps do not need to be repeated.

#### PMF Slot diaphragm

<b>NOTE</b>
-------------

<b>Perform the check with the lowest possible kV values so that the front edges of the diaphragm can be imaged well.</b>
--

- Select I.I. full format.
- Open the slot diaphragm completely. The slot diaphragm blades are no longer visible at the edges of the image.
- Select the I.I. zoom format.
- Open the slot diaphragm completely. The slot diaphragm blades are no longer visible at the edges of the image.
- Close the slot diaphragm.
- Rotate the slot diaphragm in each case by +360° and -360° under fluoroscopy.



#### PMF Image rotation

- Check the image rotation (camera rotation). Run through the entire rotating range from +220° to -220°.
- Check the pre-display for image rotation.

#### PMF Monitor display of the iris collimator opening

**NOTE**

**Perform the check with the lowest possible kV values so that the front edges of the diaphragm can be imaged well.**

- Check the monitor display of the iris collimator opening in the full format and zoom format.
- For this purpose, move to the largest and smallest diaphragm opening in each case without fluoroscopy and then switch on fluoroscopy briefly. Assess the actual opening of the iris collimator in relation to the previously displayed opening of the monitor display. Slight deviations are permitted.

**PMF****Monitor display of the slot diaphragm positions****NOTE**

**Perform the check with the lowest possible kV values so that the front edges of the diaphragm can be imaged well.**

- Check the monitor display of the slot diaphragm positions in the full format and zoom format.
- For this purpose, move to the largest and smallest diaphragm opening in each case without fluoroscopy and then switch on fluoroscopy briefly.
- Then close the slot diaphragm and rotate it by  $+90^\circ$ ,  $+180^\circ$ ,  $-90^\circ$  and  $-180^\circ$ . In each case switch on fluoroscopy briefly and assess the position of the slot diaphragm in relation to the previously displayed position of the monitor display. Slight deviations are permitted.

**5 Final result/quality inspection and maintenance**

- Refit all covers. Pay attention to protective conductor connections.

**SIE Image quality (IQ) quick test**

- Perform the ARCOSKOP image quality quick test.

**PMP Maintenance**

- Entire system: Touch up any paint damage as needed.



## 6 Final Work Steps

### SIE Protective conductor test

- Perform the protective conductor test according to ARTD-002.731.17....
- The protective conductor resistance must not exceed 0.2 ohms.

### SIE Equivalent leakage current

- Measure and record (system folder, register 6) the equivalent leakage current and compare it to the value measured during the initial start-up. The measured value must not exceed the initially measured value by more than 50%. In addition, the limit of 2 mA must not be exceeded. Provide a copy of the certificate to the operator for filing in the system operator manual, register 9.

<b>NOTE</b>
-------------

---

**The instructions according to ARTD-002.731.17 are to be adhered to outside the scope of validity of DIN VDE 0751.**

---

## 7 Changes to Previous Version

Converted documentation to DMS